

Application Number : 09/898,823

Applicants : Chris Eberspacher and Karen L. Pauls

Title : "Method of Forming Particulate Materials for Thin-Film Solar Cells "

Examiner : Elena Tsoy / 1762

Amendments to the Claims

Please amend the claims as follows:

1 -50. (canceled)

51. (previously presented) A method for making single-phase mixed-metal metal oxide particles with an average diameter of less than about 1 micron useful for fabricating thin-film photovoltaic devices, comprising:

preparing a solution comprising Cu and In and/or Ga as dissolved metals and/or metal-containing compounds;

forming droplets of the solution; and

heating the droplets in an oxidizing atmosphere to pyrolyze the contents of the droplets to form single-phase copper indium oxide, copper gallium oxide or copper indium gallium oxide particles.

52. (previously presented) A method according to claim 51, wherein the particles comprise Cu, In and Ga.

53. (previously presented) A method according to claim 51, wherein said atmosphere comprises oxygen.

54. (previously presented) A method for making mixed-metal particles with an average diameter of less than about 1 micron useful for fabricating thin-film photovoltaic devices, comprising:

preparing a solution comprising Cu and In and/or Ga as dissolved metals and/or as metal-containing compounds;

forming droplets of the solution; and

heating the droplets in a reducing atmosphere to pyrolyze the contents of the droplets to form mixed-metal particles,

wherein said mixed-metal particles comprise Cu in a metallic phase and In and/or Ga in an oxide phase.

55. (previously presented) A method according to claim 54, wherein the mixed-metal particles comprise at least one phase substantially enveloping at least one other phase.

56. (previously presented) A method according to claim 54, wherein the droplets are heated at between about 350 and about 1050°C in a reducing atmosphere.

57. (previously presented) A method according to claim 54, wherein the droplets are heated at about 500°C in a reducing atmosphere.

58. (previously presented) A method according to claim 54, wherein the atmosphere comprises about 10 volume percent hydrogen.

59. (currently amended) A method for making multi-phase mixed-metal oxide particles with an average diameter of less than about 1 micron useful for fabricating thin-film photovoltaic devices, comprising:

preparing a solution comprising Cu and In and/or Ga as dissolved metals and/or metal-containing compounds;

forming droplets of the solution; and

heating the droplets in a substantially inert atmosphere ~~or in a reducing atmosphere~~ to pyrolyze the contents of the droplets to form mixed-metal particles,

wherein said mixed-metal particles comprise multiple metal oxide phases.

60. (previously presented) A method according to claim 59, wherein the mixed-metal particles comprise at least one phase substantially enveloping at least one other phase

61. (previously presented) A method according to claim 59, wherein said atmosphere comprises nitrogen.